

NOTES ON WEST AMERICAN CRUSTACEA.

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With Plates xx, xxi.

Order DECAPODA.

Suborder BRACHYURA.

Family PINNOTHERIDÆ.

PINNOTHERES NUDUS sp. nov.

Carapax a little broader than long, subquadrate to orbicular in outline, convex, curving downwards towards all the margins; the surface is smooth and naked, and the regions not defined. Front deflexed, rounded, not protruding, the central portion continued downward as a triangular process between the antennules, while there are smaller triangular processes at the sides partly separating the orbits from the antennular fossettes. Orbits ovate, the rather wide inner hiatus partly filled by the base of the antennæ; eye peduncles very short and stout, the cornea minute. Antennules oblique; the antennular fossettes communicate with each other beneath the front. Maxillipeds oblique, neatly fitting the buccal area; the meros broad, smooth, subquadrate, the outer margin produced into a broadly rounded laminate expansion; the penultimate joint is oblong, distally rounded; the last joint is spatulate, articulated near the base of and extending somewhat beyond the preceding one. Chelipeds moderate, smooth, nowhere furnished with spines or teeth; hands narrow, rather thick, and widest immediately behind the articulation of the dactyl; fingers nearly or quite as long as the palm, subconical, and not conspicuously dentate on the inner margins. The three anterior pairs of ambulatory legs are subequal; the fourth pair is smaller; all are smooth, little compressed, and have acute, nearly straight tarsi, those of the fourth pair being relatively

longer and more slender than in the preceding pairs. The abdomen of the female is nearly circular in outline and covers the entire sternal surface. It is composed of seven segments, the fourth, fifth and sixth being subequal and larger than the others.

Two females collected by Dr. Anderson at Santa Cruz.

Breadth of specimen, 24 mm.; length, 20 mm.

Breadth of specimen, 19 mm.; length, 15½ mm.

The fingers in the specimens examined were partly covered by a very short, dense pubescence. The specimens upon which the foregoing description is based, together with several others described in this paper, were kindly loaned to me from the collection of the California Academy of Sciences by the President, Dr. Harkness.

CRYPTOPHRYS PUBESCENS sp. nov.

Carapax subpentagonal, convex, the median and cardiac regions tumid and separated from the hepatic and branchial by a sulcus; there is a slight depression between the gastric and cardiac regions and another behind the latter. Front slightly projecting and notched in the center. Antero-lateral margins not defined by a ridge; the sides of the carapax are broadly rounded. Orbits nearly circular; eye peduncles very short and stout. Antennules transverse; the antennular fossettes communicate with each other beneath the front. Antennæ shorter than the width of the front. Buccal area much broader than long, convex in front, concave behind. The ischium of the maxillipeds is rudimentary; the meros is large and curved, the distal margin oblique; palp two-jointed, the last joint oblong. Owing to the peculiar shape of the buccal area the maxillipeds are very oblique, the distal margins of the meros joints are parallel and longitudinal, leaving between them a nearly square area which is filled with the palpi. Chelipeds moderate, exceeding the first

pair of ambulatory legs; hand rather narrow, oblong, about as long as the preceding joints combined, somewhat compressed, and concave on the inner face; fingers about as long as the palm, subcylindrical, hooked at the tip and not dentate on the inner margin. Ambulatory legs subequal (the last pair a little shorter than the others), moderately slender, and somewhat compressed, the joints not unusually widened; the tarsi are rather slender, curved, and from one-half to two-thirds the length of the propodi. Abdomen of female rounded, slightly longer than broad, and covering the entire sternal area. The body and legs are covered with a uniform short, dense pubescence.

Length, 9.75 mm.; breadth, 10 mm.

Locality: Muleje Bay, Gulf of California.

One specimen from a vial containing a specimen of *Pinnotheres margarita* Smith, which it much resembles in form and pubescence. This species is very readily distinguished from *C. concharum* Rath. M. by the shorter, stouter, and less compressed ambulatory legs and the presence of the longitudinal sulci on the carapax, which are entirely absent in that species.

PSEUDOPINNIXA gen. nov.

Carapax much broader than long, the anterior margin nearly straight, the frontal process deflexed. Orbits nearly round. Antennules obliquely or transversely plicated, the fossettes communicating with each other beneath the front. Buccal area small, subtriangular. External maxillipeds with the ischium rudimentary, the meros large, triangular; palp three-jointed, the terminal joint joined to the tip of the preceding one. First pair of ambulatory legs the largest, the others successively diminishing in length, the last pair being quite small. Abdomen of female small, not nearly covering the sternal area.

PSEUDOPINNIXA NITIDA (Lock).

Pinnixa? nitida Lockington, Proc. Cal. Acad. Sci. vii, p. 155.

Carapax smooth, shining, a little over twice as broad as long, longitudinally convex, transversely plane, the sides evenly rounded; the anterior margin is straight; the front is broadly triangular, short, much deflexed, not at all projecting, and having a groove behind the margin. Orbits nearly as wide as long, the inner hiatus wide and partly filled by the base of the very minute antennæ. Antennules obliquely (nearly transversely) plicated. Epistoma very short, curved. Buccal area broadly subtriangular, rounded in front, the posterior portion covered by a projection of the sternum. External maxillipeds subtriangular, the ischium rudimentary; the meros is large and has the portion nearer the mouth bent inward at a considerable angle to the outer face; the first joint of the palp short and stout, the second oblong, the third very small. Chelipeds rather short, moderately stout, smooth; the meros is not much longer than the carpus; hand a little compressed, the palm thickened and provided on the outer surface with two longitudinal lines of short cilia; fingers scarcely as long as the palm, toothless, and hooked at the tip; on the upper surface of the movable finger is a line of cilia which is roughened by minute projections. Ambulatory legs ciliated on the margins; the first pair is stouter and a little longer than the others and has the anterior surface of the meros smooth and concave where it rubs against the chelipeds; the next two joints are stout; the tarsus is short, subcylindrical and curved, and tapers rapidly to an acute, corneous tip. The third pair of ambulatory legs is a little shorter than the second; both are more compressed than the first pair; the tarsi are similar in all three pairs; fourth pair very short, not reaching the distal end of the meros of the pre-

ceding pair; the penultimate joint is relatively wider than in the preceding pairs; tarsus similar to the others. Abdomen of the female rather small, not covering one-half the sternal area, and seven-jointed; the segments gradually increase in width from the first to the third, then decrease rapidly in width to the last one, which is longer than the others, subtriangular in shape, but with a rounded apex. The sides of the posterior portion of the abdomen are concave.

Lockington, in his description of this specimen, says that the "color in spirits" is "bright orange," and the specimen still retains a decided orange tinge.

Length of carapax, 5 + mm.; width, 11 mm.

Locality: Angeles Bay, Gulf of California.

This species, together with the one here described as *Pinnixa tomentosa*, were both described by Lockington as *Pinnixa nitida* under the erroneous impression that they were the male and female of the same species. He evidently had some misgivings about their specific identity, for he says: "A single specimen of each of the two crustaceans just described was collected on the same day at the same locality—namely, Angeles Bay, Gulf of California—and the two were placed by the collector (Mr. W. J. Fisher) in the same vial. Had it not been for this, I should certainly have never linked together two specimens so distinct in the relative proportions of the limbs themselves, as well as of the joints of those limbs; one covered in many places with an abundant pubescence, the other smooth and shining above and below. The proportions of the ambulatory limbs of the female agree with the genus *Pinnixa*, but in the male the increase of size is transferred to the second pair. Should these crustacea prove to be distinct the female should be *Pinnixa tomentosa*, while the male must be placed in some other

genus." An examination of these very specimens which are preserved in the collection of the California Academy of Sciences and from which our descriptions and figures are taken, has convinced us that they, indeed, belong to different genera. Moreover, the specimen Lockington considered to be a male is not a male at all, as an examination of the vulvæ and the appendages on the under side of the abdomen unmistakably shows. The abdomen is small for a female of this group, and Lockington probably did not lift it up and examine the ventral side, but concluded that the specimen was a male from the small size of that organ. As Lockington named the female *P. tomentosa*, in case it should prove distinct, this name should stand, since the supposed male belongs to a different genus.

PINNIXA TOMENTOSA Lock.

Pinnixa tomentosa Lockington, Proc. Cal. Acad. Sci. vii, p. 156.

Carapax very nearly twice as broad as long, smooth, and rounding off towards all the margins; the upper surface is somewhat flattened and there is a shallow depression behind the gastric region behind which the carapax is convex but not ridged. Antero-lateral margin broadly rounded and marked by a ridge only towards the outer extremity. Front short, with a longitudinal groove in the middle and a slight depression behind the transverse anterior margin. The distance between the orbits is about one-fourth the breadth of the carapax. Orbits transverse. Antennules obliquely plicated. Epistoma very short. External maxillipeds nearly longitudinal; meros large, subquadrate, the distal portion of the outer margin convex; the penultimate joint of the palp is moderately narrow and tapers from the base to a rounded extremity; the third joint is spatulate and joined near the base of the

preceding one and projects a short distance beyond it. Chelipeds scarcely as long as the fourth pair; the meros trigonal, hand oblong, compressed, longer than all the preceding joints combined; fingers but little more than one-half the length of the palm; the pollex is wide but abruptly narrowed near the hooked tip; dactyl curved, toothless, subuncinate at the apex. Ambulatory legs compressed; the first pair shorter and more slender than the second: the tarsus is rather slender and about as long as the propodus. The second pair stands about intermediate in size between the first and third pairs; the tarsus is not quite as long as the propodus and is relatively stouter than that of the first pair. Third pair not greatly exceeding the second in length, the tarsus much shorter than the propodus and much stouter than the tarsus of the second pair; there is no flange or groove on the posterior margin of the meros. Fourth pair shorter and relatively stouter than the first ambulatory legs but reaching beyond the distal end of the meros of the third pair; tarsus short and stout. The fourth pair closely resembles the third in most points except size. Abdomen of female transversely elliptical and covering the entire sternal surface. The carapax and legs were covered with a very short pubescence.

Length of carapax 7.5 mm.; breadth, 14 mm.

Locality: Angeles Bay, Gulf of California.

PINNIXA TUBICOLA sp. nov.

General form subcylindrical. Carapax about two and one-half times as broad as long, strongly curved downwards towards the anterior margin and sides. There is a shallow, transverse depression behind the gastric region behind which is a convex (not crested), transverse intumescence, from which the carapax curves sharply down-

wards to the broad, slightly concave posterior margin. Front short, deflexed, and not projecting beyond the general contour of the carapax; it is furnished with a short median groove, but the transverse groove behind the anterior margin, which is so conspicuous in *P. longipes*, is slightly or not at all marked. Antero-lateral margins marked by a ridge along their distal portion which intersects the postero-lateral margin at somewhere near a right angle. Maxillipeds pubescent; the postero-internal angle of the meros is curved inward, and the distal portion of the outer margin is convex; penultimate joint of the palp oblong-ovate; the last joint is spatulate and is joined near the base of, and extends considerably beyond, the preceding joint; exopod rather broad, and bearing a rounded projection near the middle of the outer side, beyond which the margin is concave. Chelipeds rather small, shorter than the second ambulatory legs, meros much larger than the carpus; hand oblong, compressed, longer than the combined lengths of all the preceding joints; fingers a little over one-half the length of the palm; the tips of the fingers are hooked and their inner margins meet when they are closed. The first pair of ambulatory legs is slender and furnished with rather slender tarsi which are about equal in length to the propodi. The second pair is much longer and stouter than the first and have relatively somewhat stouter tarsi which are a little shorter than the propodal joints. The third pair of ambulatory legs is stouter and a little longer than the second and are furnished with shorter and stouter tarsi which are conspicuously shorter than the preceding joint. The fourth pair is similar in character to the third but rarely extends beyond the distal end of the meros of the preceding pair. Abdomen of female transversely elliptical, the first joint very short, the second about one-half as long as the third. Abdo-

men of the male wider at base than the exposed sternal area on either side and tapering from the third joint, beyond which the sides are somewhat concave, to the rounded tip; the first and second segments are short and subequal; the four succeeding segments are subequal in length; the last segment is much broader than long and evenly rounded.

Length of carapax, 4 mm.; breadth, 10 mm.

This species is usually found in the leathery tubes of annelids. The legs and portions of the carapax are covered with a short pubescence, but the upper surface of the carapax is usually naked and often marbled with patches of color. There are often two ridges which extend backward from near the middle of the antero-lateral margins to within a short distance of the posterior margin of the carapax. In some specimens these ridges are quite distinct but in others they are scarcely visible.

Numerous specimens from Trinidad, Cape Mendocino and Bodega Bay.

This species is closely allied to *P. tomentosa* L., but differs from it in the relatively greater width of the carapax which is naked and furnished with much larger punctations, in the much smaller chelipeds, in the more slender ambulatory legs with relatively longer and more slender tarsi. In *P. tomentosa* there is a curved line of small pits behind the gastric region, a character which is absent in our species.

PINNIXA LITTORALIS sp. nov.

Carapax naked, flattened above; behind the median region is a transverse depression followed by a transverse intumescence behind which the carapax curves strongly downwards to the slightly concave posterior margin. The front is not strongly depressed and projects beyond the

general outline of the carapax; it is anteriorly truncated and furnished with a median groove but has no transverse groove behind the anterior margin. Antero-lateral margin marked by a ridge which begins near the orbit and runs outward and slightly backward to the side of the carapax where it curves abruptly backwards, becoming faintly marked towards its distal end. Maxillipeds nearly naked, similar in shape to those of *P. tubicola*; the last two joints of the palp are more or less grooved on the outer surface and the penultimate joint extends only a short distance beyond the preceding one. Chelipeds rather large, smooth, carpus much shorter than the meros; hand large, compressed, oblong, but widening slightly distally, and exceeding in length all the preceding joints combined; thumb short, edentulous, directed obliquely downwards and furnished at the tip with a notch into which the point of the movable finger closes; the movable finger is much longer than the thumb, edentulous, and curved so that when it is closed against the thumb a large rounded space is left between them. Ambulatory legs almost entirely naked, more slender than in *P. tubicola*: the first pair is considerably shorter than the second which is but little shorter than the third; the fourth pair may extend a little beyond the meros of the third; the tarsi are in all the legs little, if any, over one-half the length of the propodi and are curved at the corneous tips. Abdomen of male tapering evenly from the base to the tip; the last joint is subtriangular, about as broad as long, the apex rounded; the preceding joint has the sides concave but the sides of the remaining joints are straight; the first and second joints are subequal and together about as long as the third; the remaining segments subequal in length.

Length of carapax, 4.5 mm.; breadth, 9.5 mm.; length of third ambulatory leg, 11 mm.

Locality: Bodega Bay; near Fort Bragg.

Some of the specimens were found in the holes of the common clam (*Mya*), others were picked up on the shore. This species is easily recognized by its smooth, shiny appearance, its projecting front and large hands with the large gap between the fingers. There is no crest or groove on the meros of the third ambulatory legs either in this species or *P. tubicola*.

PINNIXA LONGIPES Lock.

Tubicola longipes Lockington, Proc. Cal. Acad. Sci. vii, p. 55.

Pinnixa longipes Lockington, Proc. Cal. Acad. Sci. vii, p. 156.

Pinnixa longipes Streets & Kingsley, Bull. Essex Inst. ix, p. 107.

Carapax considerably more than twice as broad as long, smooth, somewhat flattened above and furnished with a transverse depression behind the gastric region. Front slightly projecting and furnished with a groove just behind and parallel with the transverse anterior margin; there is also a short longitudinal median groove which becomes deeper toward the anterior margin of the frontal process. Antero-lateral margin rounded, usually marked by a more or less evident ridge, and meeting the concave postero-lateral margin at an acute angle. Posterior margin long and straight. The lower edge of the anterior margin of the carapax (not the antero-lateral margin proper) is furnished with long hairs. There is a ridge which runs from the outer end of the orbit downwards and outwards to the edge of the carapax. Orbits oblong, transverse. Antennulæ obliquely plicated. Maxillipeds oblique, furnished with long hairs, the meros large, nearly twice as long as broad, the outer margin convex; the penultimate joint is subovate; the last joint is broadly spatulate, joined near the base of and slightly exceeding the preceding one; the expod has the edges parallel and the outer distal angle concave. Chelipeds small, short, hairy;

hands oblong, compressed; fingers shorter than the palm. The first two pairs of ambulatory legs are slender (the second somewhat larger than the first) and furnished with slender, nearly straight tarsi which are about equal to the propodal joints. The fourth pair of pereopods is very large, considerably longer than the breadth of the carapax and about two-thirds as wide as the carapax is long; on the posterior margin of the meros is a kind of flange above which is a shallow groove; tarsus shorter than the propodus, stout, curved. The last pair is small and proportionately stouter than the anterior ambulatory legs, and has the edges densely hairy. This pair scarcely reaches beyond the middle of the meros of the preceding pair; the carpus and propodus are about as broad as long, the tarsus short and stout, similar to that of the fourth pair. All of the legs are compressed and more or less hairy. Abdomen of female transversely elliptical and seven-jointed. Abdomen of male seven-jointed, the first two joints shorter than the others, the last joint broader than long and rounded at the tip. The male abdomen tapers evenly from the base which is about one-third the width of the thoracic sternum to the last joint.

This crab is remarkable for its great width and the great development of the fourth pereopods. It lives in tube of a species of annelid.

Lockington in his description of this species states that the third joint of the external maxillipeds is very small, the second stout and large. He probably mistook the meros for the second joint, for the latter is rudimentary or absent in the subfamily to which *Pinnixa* belongs.

Locality: Tomales Bay.

This description is taken from Lockington's type specimens.

Suborder ANOMOURA.

Family LITHODIDÆ.

ACANTHOLITHODES gen. nov.

Carapax lyrate, flattened, and covered with setose spines. Rostrum rather prominent and terminated by strong spines. The first basal joint of the antennæ has one or more spines on the outer side; the second basal joint is produced forwards on the outer side into a long, pointed process whose outer margin is armed with several strong spines; there is a pointed, spiny, movable acicle which is joined to the end of the second joint above the base of the spiny process; the third basal joint is small and joined to the ventral side of the preceding one; the fourth and fifth joints are subcylindrical. The ischium of the third maxillipeds is widened, produced forward at the antero-internal angle and dentate on the inner margin; the last joints of the palp are not dilated. The legs are covered with setose spines; chelipeds of moderate size, more or less unequal, the fingers of one or both hands excavated within and furnished with calcareous teeth and corneous extremities. The first three pairs of ambulatory legs are subequal. Abdomen soft, the integument spiny; the first and the last two segments strengthened with calcareous plates. Type *Acantholithodes hispidus* (St.)

This genus is founded on the species described as *Dermaturus hispidus* by Stimpson (in Ann. N. Y. Lyc. Nat. Hist. vol. vii, p. 242). It differs from *Dermaturus* Brandt in the presence of spines on the body and legs, and in the large, spiny, prolongation on the outer side of the second joint of the antennæ, which is entirely absent in that genus.

Suborder MACROURA.

Family HIPPOLYTIDÆ.

HIPPOLYTE CALIFORNIENSIS sp. nov.

A long, slender species. Rostrum slightly longer than the carapax, slender, nearly horizontal, very slightly upturned, tapering uniformly to the tip; on the upper margin it is armed with three to five low, acute teeth, the points of which are directed forwards and slightly upwards; on the lower margin there are four or five similar teeth, the last one being so near the tip of the rostrum as to give it the appearance of being bifid. The base of the rostrum is rounded above and there is a spine on either side of it above and behind the ocular peduncles. On the upper part of the anterior margin of the carapax is a tooth below which is an acute spine. There is a convexity but no spine at the lower angle of the margin, but there is a prominent spine within the margin behind the base of the second antennæ.

Peduncle of the first antennæ about one-half as long as the rostrum, the spine at the outer side of the base flattened and about two-thirds as long as the first joint which is much depressed and has the inferior inner margin produced and furnished with a spine. Outer flagellum not reaching the tip of the rostrum, much shorter than the slender inner flagellum, the last few joints much more slender than the preceding ones.

The second antennæ may equal the length of the body; the scale is narrow and nearly reaches the tip of the rostrum in some cases.

The apical plate (psalistoma) of the mandibles is very slender, flexible, and bears five or six teeth at the tip.

The third maxillipeds are slender and short, not reaching the tip of the peduncle of the second antennæ; the

second joint has a laminate expansion on the inner side; the third joint equals or somewhat exceeds the last two and has the inner margin concave; the last joint is about twice the length of the preceding one and armed around the tip with nine to eleven spines.

The first pereopods are exceedingly short but stouter than the succeeding pairs; the carpus is excavated so as to receive the rounded lobe of the hand; the hand is broadened and thickened at the base where it is produced backwards into a prominent lobe; fingers excavated, their tips furnished with several small spines. Second pereopods slender, much longer than the first pair, but shorter than the third, the carpus three-jointed (the first joint the longest); hand slender, not half as long as the carpus, fingers excavated within. The last three pairs of pereopods decrease successively in length.

Abdomen slender, not at all crested or carinated; the postero-lateral angles of all of the segments except the last one rounded. Telson truncated and spinulose at the tip and furnished with a few spinules near the lateral margin.

Length of specimen, 38 mm.

Color, green.

Taken in Bodega Bay, July, 1894. The females were loaded with ova.

Family MIERSIIDÆ.

MIERSIA PACIFICA sp. nov.

Rostrum about as long as the carapax, slender, tapering uniformly to the tip; there may be either one or two spines on the upper side and on the under side the number of spines varied in the specimens examined from five to nine. The spines are less distant from each other near the base of the rostrum but there may be two close to-

gether near the tip or but one spine so situated that the rostrum may appear either trifid or bifid. The carapax is not crested in front. There is a supra-orbital spine and two spines on the anterior margin of the carapax the upper one of which is situated just below a short suborbital tooth. The antennules are provided with two long flagella which usually do not differ markedly in length; the outer flagellum presents a tolerably well marked division into a basal portion and a more slender and somewhat longer distal part. The first joint of the antennular peduncle is transversely hollowed out and furnished with an external spine which usually extends a little beyond the tip. The antennal scale reaches about to the tip of the rostrum and the flagella often exceed the length of the body. The mandibles are devoid of a palp and are divided (but not deeply so) into a molar process and a broad, thin, dentate cutting edge.

The maxillipeds do not reach the tips of the antennal scales but generally exceed the tips of the peduncles; the exopod may reach beyond the tip of the penultimate joint and always exceeds the third one; the last joint is longer than the preceding one and is furnished with a row of spines on the distal third of the inner margin.

All of the pereopods, except the last pair, are furnished with exopods. The first pair is short, the carpus short, distally widened; hand oblong, not very much broader than thick; at the proximal end is a rounded process which fits into a concavity in the distal end of the carpus; fingers nearly as long as the palm, excavated within, the tips rounded and furnished with a dense tuft of setæ. Second pereopods longer than the first but shorter than the third; carpus not annulated, hand slender, strongly incurved; fingers with setæ at the tip. The three following pairs of pereopods are subequal; the tarsi are not

one-third as long as the preceding joints, the lower margins spinulous. Telson tapering to a truncated or broadly rounded spinulous extremity.

Length of specimen, 5 cm.

Several specimens from Sonoma county, Cal. (L. E. Ricksecker).

Family PALÆMONIDÆ.

PALÆMON RITTERI sp. nov.

Carapax shorter than one-half the length of the abdomen, the anterior half or third crested. There is a spine beneath the angular suborbital projection of the anterior margin of the carapax, and on the margin below this is another situated behind the base of the second antennæ and above the rounded antero-inferior angle. No hepatic spine. Rostrum a little longer than the carapax, and tapering tolerably evenly from the widest portion (which is about one-fourth as wide as the rostrum is long) to an acute tip. The upper margin is armed with seven or eight teeth of which the posterior one is situated on the gastric region and the anterior one (often small) some distance from the tip. On the inferior margin of the rostrum are three teeth, the anterior one rather remote from the tip. Ocular peduncles short and stout; the ocellus lies between the cornea and the stalk. The first basal joint of the first antennæ is about twice as long as broad; the spine on the outer side reaching about to the middle of the joint; there is a small tooth at the antero-external angle. The next two joints are short and cylindrical; the inner flagellum is slender and rather long. Outer flagellum flattened and entire to a distance about equal to the length of the third joint of the peduncle where it divides into a slender, external portion which is longer than the internal flagellum and a short and closely annulated portion which is not greatly longer or shorter than the pe-

duncle. The second antennæ are furnished with an oblong scale which is shorter than the rostrum; the flagellum is very slender and longer than the body. Mandibles with an oblong molar tubercle and a curved, somewhat tapering, dentate cutting edge and a three-jointed palp which is about as long as the cutting edge. Third maxillipeds reaching about to the tip of the peduncle of the second antennæ, and furnished with a slender exopod which is nearly or quite as long as the antepenultimate joint; terminal joint about three-fourths as long as the preceding one. First pair of chelipeds slender and not reaching beyond the tip of the rostrum; the carpus is very little longer than the preceding joint and bears no spine; hand but little over one-half the length of the carpus, slender, linear, the fingers straight and about as long as the palm. The second pair very little longer than the first and like them do not extend beyond the tip of the rostrum; the carpus is not one-half as long as the preceding joint and is nearly as long as the palm of the propodus. Hand slender, linear, slightly bent, the fingers nearly as long as the palm, nearly straight, the tips hooked. The three remaining pairs of pereopods are subequal in length and a little longer than the chelipeds; propodi spinulous on the posterior margin, about twice the length of the carpi; tarsi slender, curved, acute.

Telson rounded above, longer than the preceding joint and furnished with two or three pairs of aculei near the margin and several setæ at the tip.

Length, 4.5 cm.

Taken by Dr. Ritter at San Diego, July, 1891. Four specimens.

This species is near *Palæmon squilla, serratus* and especially *affinis* M. Edw. From the last named species it differs in the broader rostrum, the much shorter second

chelipeds, and in the position of the ocellus which is not entirely separated from the cornea as described and figured by Spence Bate (Challenger Reports xxiv, p. 782, pl. cxxviii), nor situated in the cornea as in *P. squilla*, but is between the two.

Family PENEIDÆ.

PENÆUS CANALICULATUS Olivier.

P. canaliculatus Olivier, Encycl. Method. viii, p. 660. *P. canaliculatus* M. Edwards, Hist. Nat. Crust. ii, p. 414. *P. canaliculatus* Spence Bate, Challenger Reports xxiv, p. 242.

The three specimens we have of *Penæus*, one from southern California and two from San Francisco Bay, we refer without much doubt to the above species which is fully described and figured by Spence Bate in the Challenger Reports. It is probable that the species from the west coast of Nicaragua, described by Kingsley as *P. brevirostris* (Proc. Phil. Ac. Sci. 1878, p. 98) and subsequently referred by him to *P. Braziliensis* (l. c. 1879), should have been referred to *P. canaliculatus*, as the specimens we have agree very well with Kingsley's description. The two species are very closely allied and it is probable that they are mere geographical varieties. The specimens of *P. Braziliensis* we have seen have longer and more slender legs than our specimens, but the other differences are slight. *P. canaliculatus* was described from Japan and Australia, and varies considerably in the different localities in which it is found. *P. Braziliensis* is likewise very extensively distributed over both shores of the Atlantic Ocean.

Suborder SCHIZOPODA.

Family MYSIDÆ.

CALLOMYSIS gen. nov.

Carapax having a deep posterior sinus which leaves a portion of the pereon uncovered. Rostrum short. Eyes normal. Antennules with a setose lobe at the base of the outer flagellum; the sensory appendage usually found in the males of schizopods is absent. Antennal scale oblong, truncated, and ciliated on the inner and distal margins; outer margin naked and terminating in a spine. The gnathopods resemble the maxillipeds but have a larger endopod. The distal portion of the thoracic legs is divided into numerous articulations. Pleopods in the female rudimentary and biramous, the outer ramus smaller than the inner one. In the male the pleopods are small, biramous, the outer ramus of the third pair elongated; the fourth and fifth pairs short. Inner ramus of the uropods furnished with the usual auditory apparatus. Telson well developed, the margins spinous, the tip provided with an emargination in which are situated several spines. Marsupial pouch formed by two pairs of large lamellæ and a rudimentary third pair.

CALLOMYSIS MACULATA sp. nov.

General form rather slender. Carapax not one-half as long as the abdomen, with broadly rounded antero-lateral and postero-lateral angles. Rostrum short, subtriangular. Abdomen subcylindrical, slightly tapering, the posterior segment the longest. Ocular peduncles pyriform; cornea subhemispherical. The antennular peduncles are moderately stout, the first and third joints oblong (the third shorter than the first), the second joint a little broader than long; the outer flagellum is considerably longer than the inner one but shorter than the body and

bears a setose lobe at the base. The peduncles of the antennæ are shorter than those of the antennules and have the last joint about as broad as long; the scale is shorter than the peduncle and extends as far forward as the tip of the penultimate joint of the antennules; the flagellum seldom exceeds one-half the length of the body. The mandibles have a molar tubercle and a dentate cutting edge; the second joint of the long palp is arcuate and longer and much broader than the third, which is slender and tapers to a subacute tip. First maxillæ normal. Second maxillæ with three oblong masticatory lobes and a subovate exognath which bears 13-16 marginal setæ; second joint of palp oblong-ovate.

Maxillipeds with broad basal joints; the exopod much longer than the endopod, the terminal portion divided into numerous (fifteen in specimens) articulations; the terminal joint of the endopod is rounded, thickly setose and devoid of a claw. The gnathopods closely resemble the maxillipeds but the endopod is larger and the terminal joint is subacute. The following pair of appendages has the endopods longer than the exopods; the terminal portion is longer than the preceding joint and divided, in several specimens examined, into ten to thirteen setiferous articulations. The remaining thoracic legs are similar to the pair of appendages just described.

Pleopods rudimentary in the female, mostly shorter than the width of the abdominal segments to which they are joined and bearing a minute outer branch. The first pair is longer than the others and bears two short, subequal rami at the tip of the relatively long peduncle.

In the male the first pleopods have an oval peduncle which is furnished with plumose setæ along the outer margin; the outer ramus is longer than the peduncle and is divided into several setiferous articulations; the inner

ramus consists of a single, small, oblong joint which is shorter than the peduncle and bears several plumose setæ. The second pleopods are a little longer than the first pair, the inner ramus is shorter than the outer but like it divided into several joints. In the third pair the inner ramus is short but the outer one is long and slender and reaches back further than the penultimate abdominal segment; the terminal joints are much elongated but towards the base the annulations become closer. The fourth and fifth pleopods are subequal and a little shorter than the first two pairs; the inner rami are shorter than the outer and like them are divided into several setose articulations.

Uropods subequal in length and equaling or a little exceeding the telson. The inner one is a little narrower than the outer and subacute; the outer one rounded at the tip. Both are fringed on both sides with plumose setæ. Telson subrectangular, between two and three times as long as broad, each outer margin furnished with eight spines of which the terminal one is the largest. In the emargination at the apex are 10-13 slender spines which increase in length from the innermost one to the second or third from the outermost.

Color nearly transparent, with large black spots from which radiate numerous irregularly branching streaks. These spots do not occur on the carapax; there is usually one on each side of each abdominal segment and two on the anterior plate of the marsupial pouch. There is a spot on the telson and another partly on the telson and partly on the last abdominal segment.

Length, 15 mm.

Taken at Trinidad from a sandy beach in which they burrow, June, 1894. The females had their marsupial pouches filled with eggs or larvæ.

Order PHYLLOPODA.

Family APODIDÆ.

LEPIDURUS LEMMONI sp. nov.

Carapax oval in outline; the sides are furnished with numerous small teeth which begin near the rounded antero-lateral angles and become longer, more slender and more closely set towards the postero-lateral angles; the dorsal crest of the carapax is furnished with a variable number of unequally spaced spine-teeth which varied in the specimens examined from ten to fifteen. The posterior emargination of the carapax is furnished with from five to seven teeth (counting the terminal ones), the number of teeth on the two sides being often different in the same individual. The postero-lateral angles are nearly right angles. The eyes are usually reniform and their anterior ends lie near together. The inter-ocular tubercle is round, small, considerably elevated and located considerably behind the posterior margins of the eyes. Antennæ short, simple, smooth. Second antennæ absent. Labrum nearly square but with rounded angles. The maxillæ are deeply divided into an anterior lobe which is ciliated and a larger posterior lobe which is spinulose along its inner edge. The first pair of legs are of moderate length, none of the endites in the specimens examined reaching further back than the postero-lateral angles of the carapax; the second endite reaches but little beyond the base of the third which is considerably longer than the fourth; the fifth forms a short, pointed, ciliated scale; gill triangular.

In the second pair the second endite scarcely reaches the base of the terminal ones, the third is about two-thirds as long as the fourth; the fifth is about as long as the fourth, acutely pointed and finely pectinated on the inner

edge. The eleventh pair of legs in the female are similar to those of *L. glacialis*. There are usually about five of the terminal abdominal segments exposed and nearly an equal number (sometimes less) which are devoid of appendages on the ventral side. The number of spines on the penultimate abdominal segment is never far from twelve. On the upper side of the last segment is a small, spinulous prominence in front of the base of each stylet. The telson is rather long, oblong, somewhat wider in the middle, and may be rounded, truncated (obliquely so in some specimens), or, in some cases, bilobed; the margins are furnished with several minute spinules, and there are, in most of the specimens, two spines in the middle line at the base, but in one specimen there were three spines at the base and a small one near the middle. Except where the teeth are situated, there is no median ridge or carina, as in *L. Cousii*. The caudal stylets are minutely spinulous and are longer than the body including the telson.

Length, 28 mm.

Color (in alcohol), greenish.

Four females and one male loaned by Mr. Rivers.

Collected at Honey Lake, by J. S. Lemmons.

This is the fourth species of *Lepidurus* that has been described from North America and the first member of the Apodidæ reported from the Pacific Slope. When Packard wrote his Monograph of N. Am. Phyllopods only two species of that group were known (*Estheria Californica* P. and *E. Newcombii* Baird), and I believe no species has been added since.

This species differs from *L. Cousii* Packard, to which it is more nearly related than to any other American species, in the spinous crest and sides of the carapax, in the absence of a carina on the telson, in the greater length of

the caudal stylets and in several differences in the relative proportion of the parts of the appendages. Judging from the measurements of the species described by Packard, this is the largest of the North American species.

NOTE.—After the first part of the present article had been printed, I found that Ortmann had recently employed the name *Pseudopinnixa* for a genus of Pinnotheridæ, which is the same name that I proposed for an allied genus of the same family. I propose, therefore, to change the name of my genus to PARAPINNIXA.

EXPLANATION OF FIGURES.

PLATE XX.

- Fig. 1. Pinnotheres nudus, outline of carapax.
- Fig. 2. Pinnotheres nudus, abdomen of female.
- Fig. 3. Pinnotheres nudus, 3d maxilliped.
- Fig. 4. Pinnotheres nudus, chela.
- Fig. 5. Pinnotheres nudus, 1st ambulatory leg.
- Fig. 6. Cryptophrys pubescens, general outline.
- Fig. 7. Cryptophrys pubescens, buccal area.
- Fig. 8. Parapinnixa nitida, general outline.
- Fig. 9. Parapinnixa nitida, 3d maxilliped.
- Fig. 10. Pinnixa tomentosa, 3d maxilliped.
- Fig. 11. Pinnixa tomentosa, chela.
- Fig. 12. Pinnixa tomentosa, 1st ambulatory leg.
- Fig. 13. Pinnixa tomentosa, 3d ambulatory leg.
- Fig. 14. Pinnixa littoralis, chela.
- Fig. 15. Pinnixa littoralis, front.
- Fig. 16. Pinnixa littoralis, 3d ambulatory leg.
- Fig. 17. Pinnixa tubicola, chela.
- Fig. 18. Pinnixa tubicola, 3d ambulatory leg.
- Fig. 19. Pinnixa longipes, general outline.
- Fig. 20. Pinnixa longipes, 3d maxilliped.
- Fig. 21. Hippolyte californiensis, outline of carapax.
- Fig. 22. Hippolyte californiensis, 2d chela.
- Fig. 23. Hippolyte californiensis, 2d cheliped.
- Fig. 24. Hippolyte californiensis, 3d maxilliped.
- Fig. 25. Hippolyte californiensis, 1st cheliped.
- Fig. 26. Hippolyte californiensis, mandible.

PLATE XXI.

- Fig. 27. *Miersia pacifica*, rostrum.
Fig. 28. *Miersia pacifica*, carpus and hand of 2d cheliped.
Fig. 29. *Palæmon Ritteri*, 2d cheliped.
Fig. 30. *Palæmon Ritteri*, 1st cheliped.
Fig. 31. *Palæmon Ritteri*, mandible.
Fig. 32. *Palæmon Ritteri*, 3d maxilliped.
Fig. 33. *Palæmon Ritteri*, carapax.
Fig. 34. *Palæmon Ritteri*, eyestalk.
Fig. 35. *Palæmon Ritteri*, antenna.
Fig. 36. *Callomysis maculata*, side of carapax.
Fig. 37. *Callomysis maculata*, dorsum of carapax.
Fig. 38. *Callomysis maculata*, telson and uropods.
Fig. 39. *Callomysis maculata*, antenna.
Fig. 40. *Callomysis maculata*, antennule.
Fig. 41. *Callomysis maculata*, mandible.
Fig. 42. *Callomysis maculata*, 1st pleopod of female.
Fig. 43. *Callomysis maculata*, 1st pleopod of male.
Fig. 44. *Callomysis maculata*, 3d pleopod of male.
Fig. 45. *Lepidurus Lemmoni*.
Fig. 46. *Lepidurus Lemmoni*, 1st leg.
Fig. 47. *Lepidurus Lemmoni*, maxilliped.
Fig. 48. *Lepidurus Lemmoni*, 11th leg of female with the ovigerous sack.
Fig. 49. *Lepidurus Lemmoni*, 2d leg.